

3

Notes on the Behavior and Habits of the Medusa, *Olindias phosphorica tenuis* Fewkes

C. M. BREDER, JR.

The American Museum of Natural History, New York 24, N. Y.

(Plates I & II)

INDIVIDUALS of *Olindias phosphorica tenuis* Fewkes are occasionally seen drifting past a submerged light at the head of the dock at the Lerner Marine Laboratory at Bimini, Bahamas. They do not appear to be influenced by the light but seem rather merely to drift in the tidal flow. Nevertheless, they have always been noted to be in active locomotion, which is rather vigorous in this form. They have never been seen at this place in the daytime, a fact that is probably more than accidental, as some of the following observations suggest.

Unlike so many medusae, if these are transferred to an aquarium they live well and appear to be extraordinarily hardy. Two individuals taken at the submerged light on November 22, 1953, were maintained in an aquarium which was supplied with running sea water and which measured 2' x 1' x 1'. They were still living on December 18 when the visit to the laboratory was terminated.

It was clearly demonstrated each day that these animals are strictly nocturnal. Shortly after nightfall they became very active, moving with considerable energy throughout the confines of the aquarium. The turning on of lights did not cause them to stop swimming but did seem to reduce their activity to some extent. Plate I, Figure 1, was made by photo-flash at night in the darkened laboratory. This photograph of one of the animals in active locomotion was made just after a vigorous pulsation of the umbrella, as the animal slowly sank slightly before it was again lifted by the next pulsation. The upwardly-bent tentacles are, of course, indicative of this stage of the locomotor cycle.

Their behavior is markedly different with the coming of morning light. Then they sink to the bottom and wedge themselves into some out-of-the-way place where they remain until the

following nightfall. If routed out of their resting place they swim about for a time and then settle back to their quiescent state. At this time they bring their tentacles into tight helical coils and, unlike *Cassiopeia*, settle with the oral surface downward. In the aquarium they usually nestled in some filamentous green algae which grew on rocks and shells. In these situations they became very inconspicuous, as can be seen from Plate I, Figure 2. Here the coiled tentacles may be seen drawn up close to the inner surface of the umbrella. The outline of the exumbrella may be seen above them partly hidden by the algal filaments, the tentacles showing through its transparent substance. It is this behavior which leads us to suppose that in the sea they are only active at night.

Supplied with small fishes such as *Atherina* or *Eucinostomus*, which they probably encounter in their normal travels, they fed, one might almost say, voraciously. Contact with a tentacle quickly killed these small, fragile fishes of about one-half to three-quarters of an inch in length, and these were drawn up within reach of the rather actively exploring manubrium. The size of the fish, actually rather large for the mouth of the medusa, made necessary a considerable oral stretching. There the fish lodged for a long time, as feeding proceeded. No favored orientation was noted, but probably for fully mechanical reasons most fish were found either head or tail first in the tube-like opening. So far as could be determined, one fish per night was sufficient. Numerous others were killed by being stung but this was presumably incidental to the confined space of the aquarium.

Ordinarily these two medusae avoided each other and at no time were they seen to collide randomly. It was quite evident that the introduction of fishes to the aquarium caused them to

accelerate their activity, a process which would seem to insure a greater chance of stinging a fish. At one time when only a few fishes were presented, one of the medusae quickly caught one and soon had more than half of it in the tube-like mouth. The other and now more active medusa evidently sensed the presence of the fish which its companion was consuming. The two came together in a tangle of tentacles and the still-exposed portion of the fish was ingulfed by the second medusa. For perhaps half an hour both mouths held on to the fish, when finally the second medusa succeeded in taking it away from the first. There was no difficulty in distinguishing the two as one had a nick in its umbrella.

As an illustration of the resistance of these creatures to mechanical injury, the one mentioned above as showing a nick in the umbrella may be taken as an example. This medusa had been sucked into the small glass standpipe which served as a drain for the aquarium. In order to clear the overflow pipe, this was blown into with considerable force, causing the medusa to shoot out with some violence. The animal was so mutilated that there was no thought of its possible recovery and the seeming bit of pulp was left in the tank and forgotten. Nevertheless, a few days later the creature was moving around and about two weeks later, when the previously-described feeding episode took place, there was only a nick left to distinguish it from the other.

The following year the preceding observations were confirmed. Again only two individuals were obtained. They were caught as before, on October 27 and 28, and maintained in an aquarium until December 3, when they were preserved. This time it was convenient to feed them *Gambusia*, on which they thrived just as well as on the other species used the preceding year. In addition to swimming actively when ready to feed, these individuals frequently stationed themselves and extended their tentacles fully. Sometimes they adhered to the aquarium wall or other support near the surface and permitted their tentacles to fall to the bottom, as shown in Plate II, Figure 3. At other times they floated passively with the tentacles extended. At such times they sank slowly through the water until a certain amount of the trailing tentacles would be resting on the bottom. Evidently a definite point of equilibrium was reached because the medusae then floated motionless in mid-water, where they rested for long periods. Such a posture is shown in Plate II, Figure 5. It would seem that at such times the tentacles, which are clearly

heavier than water, counter-balanced the umbrella or some portion of it, which was evidently somewhat lighter. This would seem to be a condition essential to the observed behavior. On the other hand, during the daytime behavior, the whole animal was evidently heavier than the water, as they sank rapidly. All this suggests that in a state of nature this form not only swims about actively for feeding purposes but "fishes" in the manner described by attaching itself to some shell or other support and resting quietly until some fish or other animal strikes a tentacle. Under aquarium conditions it was noted that fish were caught by both means. Usually animals were quiescent for about twenty-four hours after feeding, and neither the active swimming nor the quiescent "fishing" were ever seen during that period. Most frequently the remains of the fish were disgorged two to four hours after catching.

The aquarium in which these medusae were kept, unlike the earlier one, was devoid of anything except the hard-rubber drain pipe and a flooring of sand. Consequently it was impossible for the medusae to hide. A typical daytime resting position is shown in Plate II, Figure 4, where one is attached to the drain pipe. The tightly coiled and pendant tentacles, typical of this resting condition, are especially evident here. This photograph is life size.

It is perhaps noteworthy that the form under discussion and *Cassiopeia*, although in different classes, Hydrozoa and Scyphozoa respectively, agree in being hardy in captivity and in having regular contacts with solids.

The present usage follows Bigelow (1938)¹ in considering the western Atlantic *O. tenuis* a subspecies of the Mediterranean *O. phosphorica*. Dr. P. L. Kramp, who was kind enough to check the identity of one of the specimens collected the second year, wrote in a letter to Dr. Libbie Hyman that *tenuis* is "... distinguished by its smaller number of tentacles, marginal clubs and centripetal canals, and, moreover, by its gonads occupying only the distal halves of the radial canals. The present specimen is peculiar in so far as its gonads are almost as long as the radial canals; it has 6-7 centripetal canals per quadrant, like *tenuis*; in the number of secondary tentacles (41) it likewise agrees with *tenuis*; but it has a much larger number of primary tentacles (97) and marginal clubs (130). Thus it seems to bridge the gap between *phosphorica* and *tenuis*." Dr. Hyman kindly read and criticized the present manuscript.

¹ Zoologica, Vol. 23, pp. 112-113.

EXPLANATION OF THE PLATES

PLATE I

Olindias phosphorica tenuis Fewkes

- FIG. 1. An individual in active nocturnal swimming, taken by photo-flash.
- FIG. 2. The same individual in diurnal rest in the shelter of algae.

PLATE II

Olindias phosphorica tenuis Fewkes

- FIG. 3. An individual in its quiescent "fishing" position, attached to the back wall of the aquarium.
- FIG. 4. A resting daytime pose, attached to the aquarium drain pipe. Life size.
- FIG. 5. Two medusae, one in the free-floating "fishing" position and the other in active locomotion. The fish is *Gambusia*.